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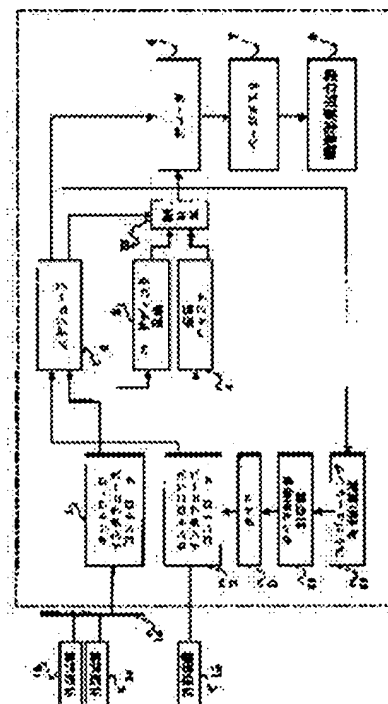
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(54) PRINTER

(57)Abstract:

PURPOSE: To execute the print job of an external device without the time over of the external device until the scheduling of the print job by controlling data reception corresponding to scheduling time and the capacity of a reception buffer.

CONSTITUTION: This printer successively prints out the print jobs requested from external devices 13, 14 and 15 while managing a queue with a scheduler 5. Time ST for the print job requested by the external device 15 for detecting the time over to be scheduled is predictively calculated by a scheduling time calculation part 11, and time interval T of $(ST-TO+C)/(BS-1) \leq T \leq (ST+C)/(BS-1)$ is calculated by a timer count value calculation part 10 corresponding to this scheduling time ST, capacity BS of the reception buffer, positive offset amount C and data transfer stop time TO so that data can be received at this time interval T.



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CLAIMS

[Claim(s)]

[Claim 1] Two or more interfaces connected to the external device of a different class, and the receive buffer which stores the data received through this interface, In the printer equipment which has the scheduler which carries out queue management of the print job demanded from the external device connected to said interface, and carries out a printout one by one At least one of said the external devices is what supervises an excess of the time amount TO of a data transfer stop time, and detects time over. The time amount count means which carries out prediction count of the scheduling time amount ST until scheduling of the print job which the external device which detects said time over required is carried out, From the capacity BS of the scheduling time amount ST in which said time amount count means carried out prediction count, and said receive buffer, and the forward predetermined amount C of offset $(ST - TO + C) / (BS - 1) \leq T \leq (ST + C) / (BS - 1)$ -- the printer equipment characterized by having a data reception-control means to receive data with a time interval T.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention has two or more interfaces linked to an external device, and relates to the printer equipment which controls data reception of the interface linked to the external device which performs time exaggerated detection especially about the printer equipment which carries out the printout of the print job demanded from each interface one by one.

[0002]

[Description of the Prior Art] In recent years, in addition to the network interface by communications protocols, such as TCP/IP (Transmission Control Protocol/Internet Protocol), the printer equipment which has non-network interfaces, such as the Centronics (Centronics) interface, is proposed. Thus, when printer equipment has two or more interfaces, the contention about printer equipment use occurs to the print job demanded from each interface. Since it blocks as a file, the gestalt, i.e., the data, in which spooling is possible, when the print job demanded from a network interface has only two or more network interfaces, are recording storage is possible to the store of the interior of printer equipment, or the exterior in the data of a print job, and since the scheduler of printer equipment carries out queue management of the demand of this print job and carries out sequential execution, the contention about printer equipment use does not pose a problem. However, since the print job demanded from a non-network interface is not the gestalt in which spooling is possible when it has a non-network interface like a Centronics interface in addition to a network interface, the contention about printer equipment use occurs in the condition in which the immediate execute of the print job of a non-network interface is possible.

[0003] With the printer equipment which has the interface with which such types differ conventionally, the contention about printer equipment is prevented by the mutual exclusion during an interface. Namely, in data, during activation, exclusion of the non-network interface was carried out, and it was refused, or, as for the demand of a print job, the network interface was disregarded [print job / under reception or]. Therefore, the external device linked to a non-network interface must require a print job, when a non-network interface is in the condition which became usable, it does not understand when a network interface becomes about data and a non-network interface becomes usable during activation under reception or about a print job, but needed to continue trying a Print job request.

[0004] Since this problem is solved, the data which will be received from a non-network interface by the time it changes into the condition that a Print job request is receivable from a non-network interface, and a network interface performs a Print job request to the scheduler of printer equipment by 1-byte data reception from a non-network interface and scheduling is carried out, also while performing under reception or a print job for data can be received to a receive buffer.

[0005] However, if a receive buffer will become full by the time the demanded print job is performed, and the data transfer of an external device is stopped, the case where the external device which is supervising the data transfer time detects time over, and terminates a print job abnormally will pose a problem here. The conventional proposal is not made about the approach of controlling the data

reception to a receive buffer until scheduling of the print job is carried out.

[0006] Since the decoder suspended actuation for a limited resource which is called single page memory while for example, the image formation section used page memory, the approach about the data reception control to the receive buffer by which the conventional proposal is made solves [be / it / under / print job's by which scheduling's was carried out activation / being related] the problem to which a receive buffer fills.

[0007] For example, the thing of an indication is conventionally known by JP,2-54328,A as the control approach of the data reception about time exaggerated prevention of an external device. Although data are received with a time interval shorter than the data stop time TO with which data will be changed to a reserve buffer if, as for the approach of an indication in this official report, a receive buffer fills, and an external device performs time-out detection, after a receive buffer fills with this approach before scheduling of the print job was carried out, the reserve buffer may have filled, the data transfer stop time may have become larger than TO, and the external device may have detected time over.

[0008] Moreover, although the printer equipment which controls the receiving rate of the data which receive data by the time interval which did the division of the completion prediction time amount of printing of the waiting data for printing by the empty byte count of a receive buffer is indicated by JP,3-57016,A, it prevents that a receive buffer fills [a print job] after scheduling, and data transfer stops this approach, and cannot prevent that a receive buffer will fill by the time scheduling of the print job is carried out, and data transfer stops.

[0009] When printer equipment has resources, such as page memory, in abundance, the data reception control to the receive buffer according a print job to a halt of the decoder after scheduling of operation does not pose a problem. However, preparing mass page memory will cause cost quantity.

[0010]

[Problem(s) to be Solved by the Invention] In the printer by which this invention has non-network interfaces, such as a network interface and a Centronics interface, in view of the above-mentioned trouble The print job from the non-network interface which the external device which supervises a data transfer stop time and detects time over connects It receives without ignoring or refusing, also while a network interface performs under data reception or a print job. By the time the demanded print job is performed, in order that intermediary data transfer [a receive buffer] to the limit may stop, it aims at offer of the printer equipment which controls data reception not to become the time over of an external device.

[0011]

[Means for Solving the Problem] Two or more interfaces connected to the external device of a different class in order that this invention may attain the above-mentioned purpose, The receive buffer which stores the data received through this interface, In the printer equipment which has the scheduler which carries out queue management of the print job demanded from the external device connected to said interface, and carries out a printout one by one At least one of said the external devices is what supervises an excess of the time amount TO of a data transfer stop time, and detects time over. The time amount count means which carries out prediction count of the scheduling time amount ST until scheduling of the print job which the external device which detects said time over required is carried out, From the capacity BS of the scheduling time amount ST in which said time amount count means carried out prediction count, and said receive buffer, and the forward predetermined amount C of offset $(ST-TO+C)/(BS-1) \leq T \leq (ST+C)/(BS-1)$ -- it is characterized by having a data reception-control means to receive data with a time interval T.

[0012]

[Function] A time amount count means carries out prediction count of the scheduling time amount ST until scheduling of the print job as which the printer equipment by this invention was required from the interface is carried out. A data reception-control means from the scheduling time amount ST which the capacity BS and said time amount count means of a receive buffer of an interface calculated $(ST-TO+C)/(BS-1) \leq T \leq (ST+C)/(BS-1)$, since data are received with a time interval T and data reception is controlled Other interfaces for data under reception or a print job also in activation It receives without

disregarding or refusing the Print job request of an interface, and a print job can be performed, without a receive buffer's filling, by the time scheduling efficiency of the print job is carried out, and the time over of the external device by data transfer halt occurring. In addition, C is the forward predetermined amount of offset decided beforehand.

[0013]

[Example] Hereafter, the example of this invention is concretely explained using a drawing.

[0014] Drawing 1 is the block diagram showing the configuration of the printer equipment which carried out this invention. 1 is a network interface controller and performs data communication control with a communications protocol with the external devices 13 and 14 which connect with the Ethernet (Ethernet: trademark) cable 16 which is communication media, and are connected to the Ethernet cable 16. 2 is a hard disk drive unit which stores data, and stores the data which external devices 13 and 14 have transmitted. 3 is a Centronics interface controller which controls reception of the data from an external device 15, and is connected with the external device 15 by the control lines, such as a data signal line which is not illustrated, a strobe signal, a busy signal, and an acknowledgement signal. 4 is a receive buffer which carries out storage storing of the data received from the external device 15 by the Centronics interface controller 3. 5 is a scheduler which performs execution control of the print job in printer equipment, it carries out queue management of the Print job request from the network interface controller 1 or the Centronics interface controller 3, performs sequential scheduling, and is performing execution control of a print job.

[0015] If the issue demand of the print job is carried out from external devices 13 and 14 at the network interface controller 1, the network interface controller 1 will register this Print job request into a scheduler 5 together with this data file name and information on data size, after storing data in a hard disk drive unit 2. A scheduler 5 performs a print job one by one in the sequence registered into the queue of a print job. In order that it may choose the data of the print job to perform, a scheduler 5 controls a multiplexer 12, inputs the data of a print job into a decoder 6, and controls actuation of a decoder 6. A decoder 6 decodes the data of a print job with directions of a scheduler 5, and changes them into image data. The image data which a decoder 6 outputs is memorized by the page memory 7. The printout of the image data memorized by the page memory 7 is carried out by the image formation output section 8.

[0016] If the issue demand of the print job is carried out from an external device 15, data transfer is started and the 1st byte of data are received, the Centronics interface controller 3 will perform a priority Print job request to a scheduler 5, and will register it into the head of the queue of the print job of a scheduler 5. A scheduler 5 will notify count activation to the scheduling time amount count section 11, if a priority Print job request is received from the Centronics interface controller 3.

[0017] The scheduling time amount count section 11 carries out the count output of the scheduling time amount ST which multiplied the unsettled data size UD which subtracted the data size which the decoder 6 already read from the data size of the print job by B which is the average processing time of 1 byte of data of printer equipment, when there is a print job under current scheduling activation.

[0018] $(ST-TO+C)/(BS-1) \leq T \leq (ST+C)/(BS-1)$ which will receive the data after the 1st byte until scheduling of the print job is carried out if the timer enumerated-data count section 10 receives the scheduling time amount ST from the scheduling time amount count section 11 -- a time interval T is calculated and it sets up as enumerated data of a timer 9. Here, TO(s) are the data transfer stop time as which an external device 15 detects time over, and the value with which BS is the capacity byte count of a receive buffer 4, and the amount of offset forward in C, and it was set as printer equipment.

[0019] Whenever a timer 9 carries out counting of the time interval T set up by the timer enumerated-data count section 10, it notifies deadline to the Centronics interface controller 3. If the busy signal which the Centronics interface controller 3 has sent out to the external device 15 performs 1 byte of data reception according to the strobe signal which it is canceled by the ready by the notice of deadline from a timer 9, and an external device sends out, the handshake from which a busy signal becomes busy will be performed. When the enumerated data T of a timer 9 are 0, the Centronics interface controller 3 sends out the busy signal of the minimum interval specified with an interface. After the scheduling time amount ST, scheduling is carried out by the scheduler 5, a multiplexer 12 chooses a receive buffer 4, a

decoder 6 decodes the received data in a receive buffer 4, it outputs to the page memory 7 as image data, and, as for a print job, the image formation section 8 carries out the printout of this image data. When fixed time data is not received from an external device 15, the Centronics interface controller 3 detects a time-out, and makes it the end of data of a print job.

[0020] Drawing 2 is drawing in the scheduling time amount ST until scheduling of the print job is carried out to a scheduler 5 which explained to the receive buffer 4 the time interval T which receives data. In addition, in drawing, the black dot and the black corner mean 1 byte of data reception. If data are received with a time interval to which a capacity BS cutting tool's (it may be BS=10 byte since it is easy here) receive buffer 4 fills to the time amount which applied the forward amount C of offset to the scheduling time amount ST which the scheduling time amount count section 11 calculated, a receive buffer will not come between the scheduling time amount ST. Since the Centronics interface controller 3 is performing the Print job request to the scheduler 5 after receiving the 1st byte of the beginning, only the maximum (BS-1) cutting tool's data are receivable between the scheduling time amount ST. As the drawing bullet angle showed, the greatest time interval performs 1 byte of data reception with the time interval of $(ST+C)/(BS-1)$, and as with a circle [drawing bullet] showed, the minimum time interval performs data reception which is 1 byte with the time interval of $(ST-TO+C)/(BS-1)$. If 1 byte of data reception is performed with a time interval in the meantime, by the time scheduling of the print job is carried out, a receive buffer 4 will not fill.

[0021] Although the example of this invention calculated the scheduling time amount ST from the number of data bytes, when data are a Page Description Language, it can also calculate advanced scheduling time amount ST by the ability it to disassemble data into a token and decode a program structure.

[0022]

[Effect of the Invention] Thus, since the printer equipment of this invention carries out prediction count of the scheduling time amount ST and controls data reception according to the capacity BS of this scheduling time amount ST and a receive buffer until the schedule of the print job which the external device which performs time exaggerated ** required is carried out, it can perform and carry out the printout of the print job of an external device, without an external device carrying out time over by the scheduling of a print job.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the printer equipment of this example.

[Drawing 2] It is drawing in the scheduling time amount ST until scheduling of the print job is carried out to a scheduler which explained to the receive buffer the time interval T which receives data.

[Description of Notations]

1 [-- A receive buffer, 5 / -- A scheduler, 6 / -- A decoder, 7 / -- Page memory, 8 / -- The image formation output section, 9 / -- A timer, 10 / -- The timer enumerated-data count section 11 / -- The scheduling time amount count section 12 / -- A multiplexer, 13-15 / -- An external device, 16 / -- Ethernet cable] -- A network interface controller, 2 -- A hard disk drive unit, 3 -- A Centronics interface controller, 4

[Translation done.]

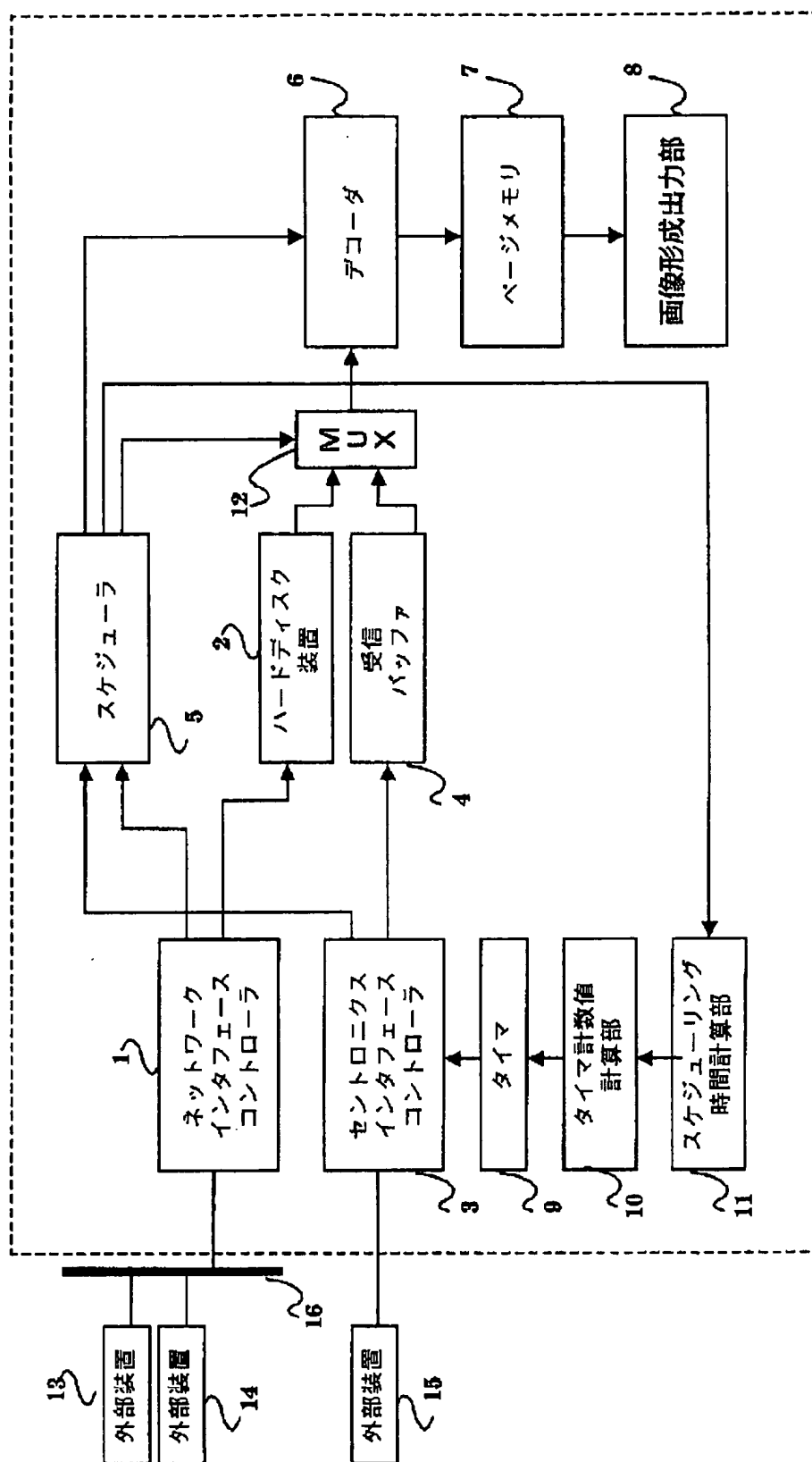
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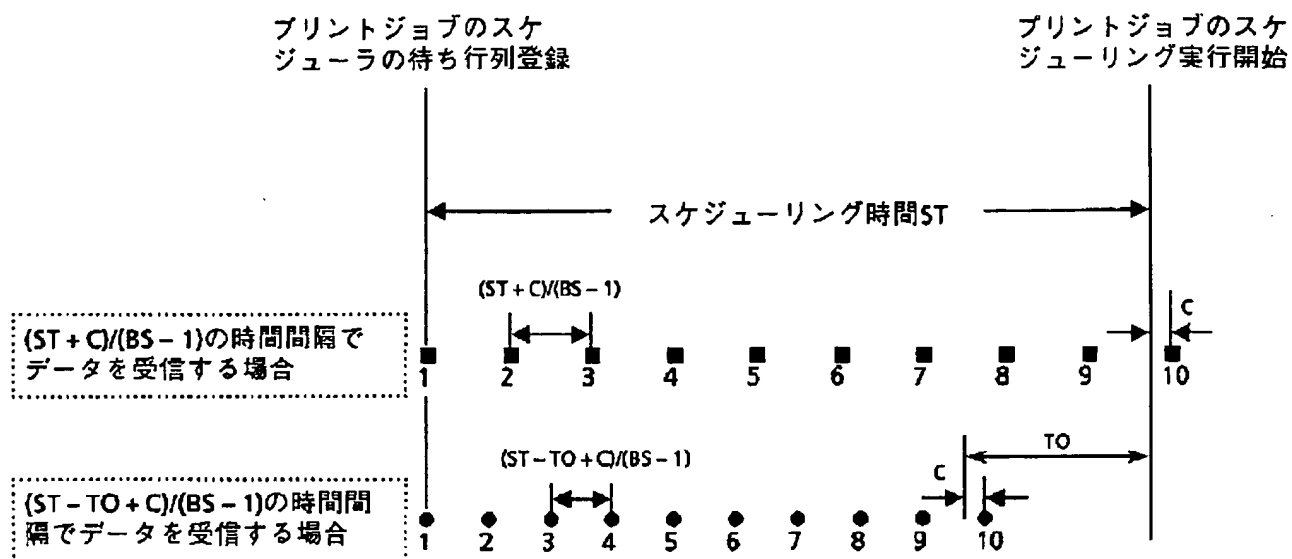
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DRAWINGS

[Drawing 1]



[Drawing 2]



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